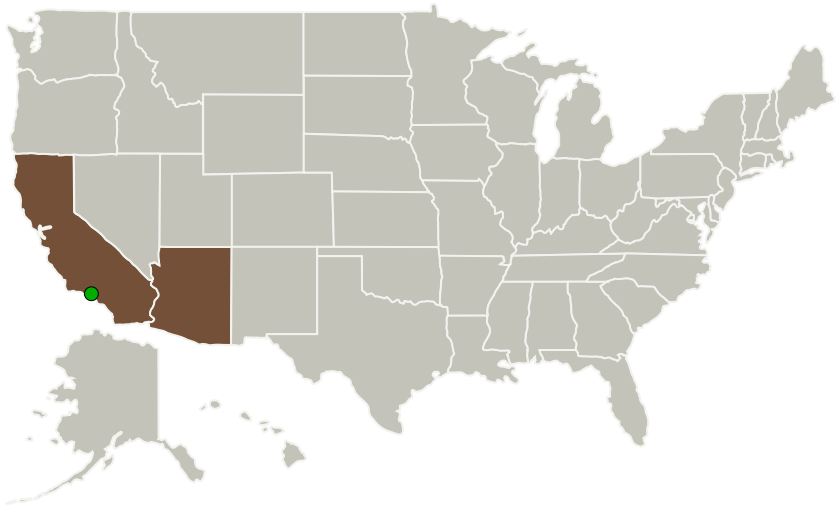
High Power Room Temperature Terahertz Local Oscillator, Phase I

Completed Technology Project (2010 - 2010)

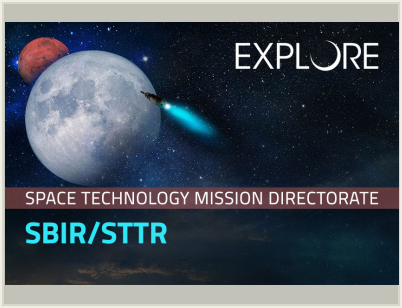
Project Introduction

We propose to build a high-power, room temperature compact continuous wave terahertz local oscillator for driving heterodyne receivers in the 1-5 THz frequency window. The local oscillator is based on the recently discovered terahertz emission of a high-power infra-red vertical external-cavity optically-pumped surface-emitting laser (VECSEL) when operated under dual-wavelength emission. The dual IR wavelength separation can be easily controlled by placing a thin etalon in the VECSEL cavity and the THz signal (corresponding to the beat frequency) is generated via a nonlinear periodically-poled lithium niobate crystal placed in the cavity. The VECSEL semiconductor gain element is designed and optimized to generate on the order of kilowatt internal circulating infra-red fields in the VECSEL cavity thereby generating tunable THz power in the milliwatt ranage. It is anticipated that this source will have wide applications within NASA and the broader commercial community.

Primary U.S. Work Locations and Key Partners



Organizations Performing Work	Role	Type	Location
Desert Beam Technologies, LLC	Lead Organization	Industry	Tucson, Arizona
Jet Propulsion Laboratory(JPL)	Supporting Organization	NASA Center	Pasadena, California



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Primary U.S. Work Locations	
Arizona	California

Project Transitions

January 2010: Project Start

July 2010: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/139995)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Desert Beam Technologies, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

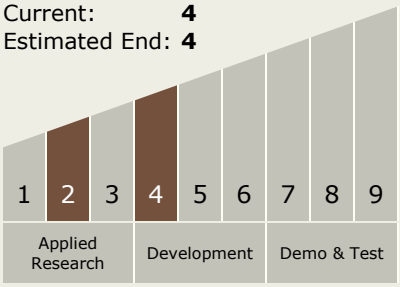
Carlos Torrez

Principal Investigator:

Joe Michael Yarborough

Technology Maturity (TRL)

Start: **2**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX02 Flight Computing and Avionics
  - TX02.1 Avionics Component Technologies
    - TX02.1.6 Radiation Hardened ASIC Technologies

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System